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# ASTRONOMICAL FORESIGHTS USED BY MEGALITHIC MAN

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Megalithic Man used various features on the horizon as foresights behind which he observed the rising or setting Sun or Moon from a marked stance or backsight. We now have surveyed a sufficient number of sites to be able to classify the foresights. Of course, in deciding what can be used as a foresight we must avoid imposing our own presuppositions; for this we are 4000 years too late and we shall never obtain a fraction of Megalithic Man's experience of choosing and using the lines he had established. Instead, we must learn from him by examining every example we can find, and we now have information about a sufficient number to be able to put them into groups.

It is quite evident that Megalithic Man has left us remains of two totally different types of line. The first type was certainly the earlier and consists of two marks which may be in the form of two circles, or of a circle and an outlying stone. The line joining these, extended to the horizon, showed the rising or setting point of (perhaps) the Sun at an important date in the calendar, such as the solstice or the equinox. Such lines are little more than symbolic however, and cannot possibly give an accurate measurement of the declination involved. The second type has a backsight (which may be a stone), the line from which to a notch on the distant horizon gives a really accurate declination of either the upper or the lower limb of either the Sun or Moon. Apparently Megalithic Man did not begin to use the second type until about 2000 B.C. Here we shall interest ourselves in this type only. By using suitably distant natural foresights he obtained an accuracy of one or two arc minutes.

It may have been that at some places he made use of distant artificial foresights of some perishable material. Possibly this happened at Stonehenge but we do not know for certain and we do not know what they looked like. We can guess that they might have consisted of huge mounds of turf or brushwood. To be clearly visible to the naked eye when silhouetted on the Moon's disc they would need to have subtended an angle of about $1\frac{1}{2}$ arc minutes which is about 2ft per mile. If we assume that the foresight was ten miles away this would have meant erecting a target of about 20ft sq., quite a possible size.

It seems desirable to classify natural foresights and this we shall now try to do. Standing in a mountainous district we may be surrounded by a rugged outline which may carry a number of possible foresights. We shall now explain how we know that some marks were used. It has been shown in a recent issue of this journal[1] that there are in Scotland some twenty-five lunar foresights for which the probability level is very low. By this we mean that the probability is very low that the limb of the Moon at the important times would pass *by accident* so near the foresight as it did. In this way we know for certain that Megalithic Man did make use of foresights on the horizon for his lunar observations.

This means that if we stand at a marked backsight and make careful measurements of the profile of part of the horizon which turns out to contain a significant

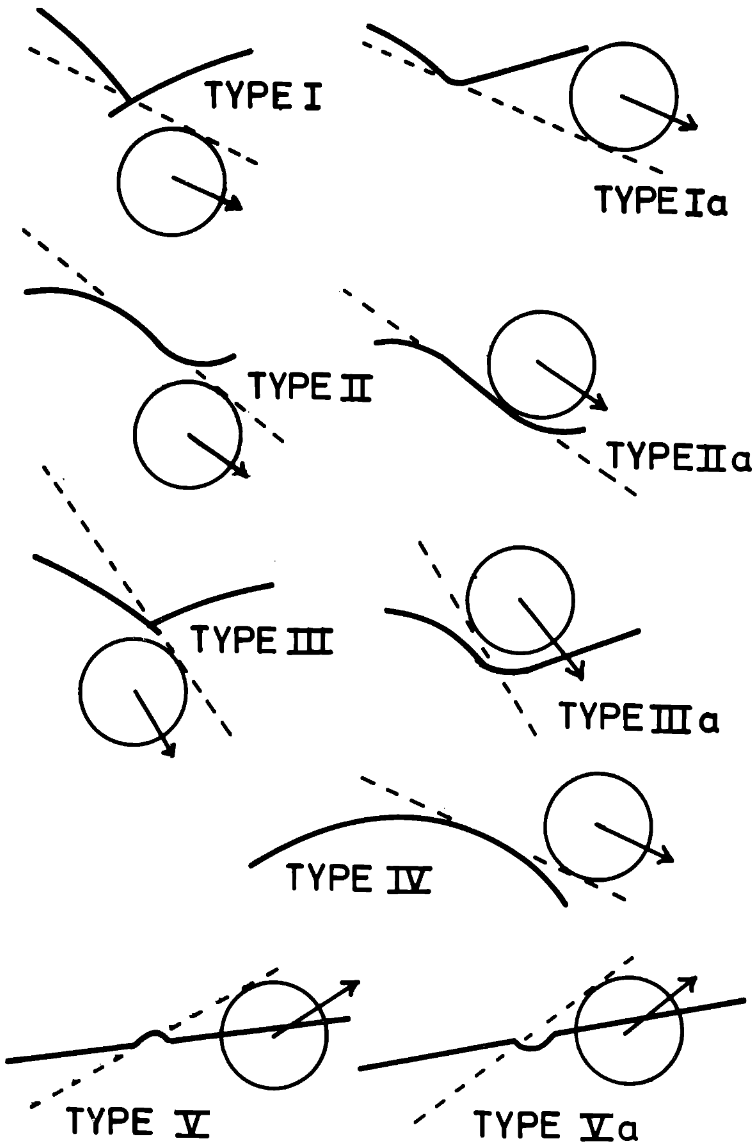


FIG. 1. Types of foresight.

position, we can assume that we are at a real observing point. Such an observing point may consist of a large stone, sometimes a particularly large stone, as at Ballinaby, and if this takes the form of a slab then the long side of the slab will point to the foresight. In other places there are two or more stones ranged up so that the line points to the foresight, at Dunskeig for example; in Orkney there are rows of earth mounds which serve the same purpose.

A foresight may have been used for either the upper or lower limb, where upper and lower refer to declination and not to altitude. When Megalithic Man wanted to mark the setting/rising positions of the Moon's centre the only method available was to get a man to range himself in for the upper limb and another to range himself in for the lower. Midway between the two was the sighting position for the centre, and this is, in a few places, marked by a stone. For all cases, as the Moon slipped past the foresight the observer moved about until his position was exact. He then marked the place by a stake. He did this for many nights and for month after month, and then deduced the final position from the stakes on the ground. Thus if, due to bad weather, he missed an observation, he could interpolate the final position on the ground.

The ideal foresight is perhaps that which we find near Kintraw where the setting Sun has been out of sight for some time before it reappears momentarily, and as it finally vanishes the upper limb twinkles in the col between Ben Shiantaidh and Ben a Chaolais. This must have been quite dramatic because the Sun had been apparently out of sight and had remained out of sight for several minutes before reappearing momentarily. As the winter solstice approached, the observer would find it necessary to move to the right by a small amount each night until the actual evening of the solstice. Dr MacKie has reported that only to the left of the backsight, at which there was a small menhir, was the observing platform levelled with small stones.[2] This kind of foresight we shall call Type I, see Figure 1 and Table 1. In Type Ia a notch was used in the same way, but with the lower limb; this cannot however have been nearly as satisfactory as Type I. In Type II the upper limb simply trickles down (or up) a small sloping part of the horizon parallel to its apparent path until it finally vanishes. In Type IIa the lower limb does the same thing.

In Type III and Type IIIa the edge of the Sun or Moon seems to run into or emerge from a sharp corner. Provided the corner was sharp this must have been satisfactory, but in one or two cases it is a very flat corner and these must have been difficult to use.

In Type IV the lower limb of the Sun or Moon appears to graze the rounded shoulder of the top of a hill. So far we have not found any cases like this for the upper limb.

Type V, of which Type Va is a variant, consists of a small irregularity in an otherwise relatively flat horizon. It appears to have been used with either limb and for rising and setting.

These are the main types, but it will be understood that variations exist. It should be remembered that at each site there might be many observers; for instance at Kintraw[3] there would probably be a row of people along the platform and they would tell afterwards what they saw, so that the last man in the row to see the gleam would be in the correct position. For the rising Moon the men would be arranged roughly in the correct position before the Moon rose, and at three or four places there is a marked stance for an observer who would be higher up and so would warn those below that the Moon was about to emerge. Much the same happened at Kintraw where farther up the hill than the platform there is a single stone showing where the watchman stood to observe the Sun and give warning. At Mid Clyth[4] on the hill behind the backsight there is a row of stones, pointing roughly to the NE foresight; these were probably for the convenience of the watchman. At Brogar[5] the large mound *A* served as a stance for the watchman when the Moon was about to rise on Mid Hill. Similarly at Brogar the huge mound, Saltknowe, formed a position for the watchman observing the Moon emerging at Kame of Corrigal.

In thinking about the phenomenon we must remember that at night the Moon was bright and the hills and sky were dark, and it might be necessary to see the silhouette on the disc in order to spot the correct position.

TABLE 1. Foresights used at various places.

| | |
|---|---|
| Type I | |
| Kintraw | *MLO*, 38, Fig. 4.2 |
| Ballochroy *S* | *MLO*, 37, Fig. 4.1 |
| Tarbert Jura | *MLO*, 40, Fig. 4.5 |
| Temple Wood $A_2$ | *MLO*, 46, Fig. 5.1 |
| Campbeltown $A_2$ | *MLO*, 62, Fig. 6.4 |
| Kilberry | *MLO*, 64, Fig. 6.7 |
| Type Ia | |
| Brogar to Hellia | *MRBB*, 124, Fig. 10.2 |
| Knockstaple | *MLO*, 63, Fig. 6.6 |
| Skipness | *JHA*, x (1979), S97, Fig. 1 |
| Type II | |
| Beacharr Kintyre | *MLO*, 61, Fig. 6.3 |
| Mid Clyth, south decl. | *MLO*, 93, Fig. 9.2 |
| Temple Wood (NW) | *MLO*, 46, Fig. 5.1 (b) |
| Ballymeanach $A_1$ | *MLO*, 52, Fig. 5.3 |
| Escart | *MLO*, 60, Fig. 6.1 |
| Tarbert, Gigha | *MLO*, 62, Fig. 6.5 |
| Kame of Corrigal | *MRBB*, 124, Fig. 10.4 |
| Type IIa | |
| Stillaig | *MLO*, 66, Fig. 6.11 |
| Type III | |
| Fowlis Wester | *MRBB*, 174, Fig. 13.5 |
| Cnoc na Maranaith | *MRBB*, 171, Fig. 13.3 |
| Type IIIa | |
| Dunskeig | *JHA*, ix (1978), 172, Fig. 2 |
| Type IV | |
| Lundin Links | *MLO*, 55, Fig. 5.5 |
| Blakeley Moss | *MLO*, 72, Fig. 6.18 |
| Type V | |
| Brogar, Mid Hill | *MRBB*, 124, Fig. 10.3 |
| Type Va | |
| Mid Clyth | *MLO*, 94, Fig. 9.3 |
| Brogar, Ravie Hill | *MRBB*, 125, Fig. 10.5 |

*JHA:* *Journal for the history of astronomy*
*MLO:* A. Thom, *Megalithic lunar observatories* (Oxford, 1971)
*MRBB:* A. Thom and A. S. Thom, *Megalithic remains in Britain and Brittany* (Oxford, 1978)

In the great majority of cases the required phenomenon occurred when the Moon was near the first or third quarter.[6] The terminator was then roughly at right angles to the direction of apparent motion. In June or December the Moon was either nearly full or nearly new.

At night with a clear sky the ground is cooling, hence a ray grazing the ground will be bent down, thus increasing the astronomical refraction. Where, at the foresight, the ray is coming over a sharp narrow ridge, the effect of graze will presumably be smaller than when the ray grazes a wide plateau on top. In 1969 we published a paper[7] in which we showed by an analysis of a large number of foresights that the total refraction which had been experienced in Megalithic times was greater than ordinary astronomical refraction. The explanation was of course that we did not then know about graze and so made no allowance.

It is of no use reporting that a lunar site has been found unless the azimuth and altitude have been measured with the greatest care and unless the calculated declination agrees within two or three minutes with the expected value. In our published work it will be found that there are many cases where the disagreement is not greater than two minutes of arc. It is really this close agreement, and not the statistical evaluation of probability level, that makes us so certain that we are dealing with genuine lunar observatories.

## REFERENCES

1. A. Thom and A. S. Thom, "A reconsideration of the lunar sites in Britain", *Journal for the history of astronomy*, ix (1978), 170–9.
2. E. W. MacKie *et al.*, "Archaeological tests on supposed prehistoric astronomical sites in Scotland", *Philosophical transactions of the Royal Society of London*, A cclxxvi (1974), 169–94, p. 181 and Fig. 6.
3. A. Thom, *Megalithic lunar observatories* (Oxford, 1971), 37.
4. *Ibid.*, 94.
5. A. Thom and A. S. Thom, *Megalithic remains in Britain and Brittany* (Oxford, 1978), 128.
6. *Ibid.*, 11.
7. A. Thom, "The lunar observatories of Megalithic Man", *Vistas in astronomy*, xi (1969), 1–29, p. 21.

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In 1974, Professor Thom and his family reported on their survey of Stonehenge in an article that was summarized in *The Times* in a review extending across three columns. Jacketed reprints of this article and of its sequel, "Stonehenge as a possible lunar observatory", are available from the publishers, price $2·50 (£1) each, post free. A small number of reprints of other articles by the Thom family are also available; details on application to the publishers.